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Case report

Application of platelet rich fibrin for management of an electrosurgery induced osteonecrosis involving maxillary alveolus

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ABSTRACT

Background: Application of principles of electrocautery for hemostasis dates back to prehistoric times. Its modern implementation in various fields of general and head and neck surgeries have been well documented. However its usage in minor oral surgical procedures has gained popularity only recently.

Complications associated with electrosurgery in the dental field are relatively rare and there is insufficient literature on its management.

Case report: We present a case report on management of an electrosurgery induced osteonecrosis involving maxillary alveolus of left premolars.

Discussion: Inadvertent contact of the electrosurgery tip on bone can result in necrosis making it necessary to remove the sequestrum and graft the defect. Platelet rich fibrin in combination with bone grafts have been well documented to provide successful periodontal regeneration.

Clinical implications: Our aim of presenting this report is to create awareness among the health care providers regarding electrosurgical injuries. To our knowledge, this is the first time platelet rich fibrin has been used in the management of intraoral electrosurgical injury. Combining bone grafts with platelet rich fibrin is a good alternative as it can be done with relative ease and predictable outcome.

Introduction

"A smile is a curve that sets everything straight". The underpinning of dentistry relies on bringing out this social attribute in its superlative semblance. The quality of smile should not be measured only by its aesthetic value but also by its health status. However, common dental diseases such as caries and periodontitis threaten to disrupt this if not addressed early.

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Surgical management of dentition and its associated structures becomes imperative when diseases affecting them cannot be addressed through conservative measures alone. Surgical techniques involving cutting procedures although still performed with the surgical scalpel, has number of drawbacks. Pertaining to this, a search for alternatives led to the introduction of diathermy that provides more precision, effective and effectual hemostasis with reduced operating time and faster healing with minimal scarring [1,2]. Though the principles of cauterizing for achieving hemostasis dates back to prehistoric times, the major breakthrough in this field is correlated with the discoveries of d'Arsonval and Franz Nagelschmidt who coined the term " Diathermy" and it's inception in its contemporary form by William T. Bovie in 1928 [3–5].

Today there are an increasing number of applications for electrosurgery in general surgery and head and neck surgery [6–9]. However its usage in minor oral surgical procedures such as frenectomy, gingival depigmentation, gingivectomies, excision of soft tissue overgrowths has gained popularity only recently. Despite of many advantages when properly used, this technique still can cause hazards to the patient, operating surgeons and assistants. Although various complications caused by electrosurgery such as burn injuries, electrocution, operating room fire, smoke inhalation have been reported in the literature its depiction in minor oral surgical procedures are rare [3]. Also management of the ensuing complications has very limited literature support making it difficult for the general practitioner to handle such situations. Hereby we present a case report involving surgical removal of hyperplasic tissue in relation to maxillary left second premolar region using electrocautery with its adverse outcome and management.

Case history

The 43 year old female patient presented with carious, non-vital tooth 25 and gingival overgrowth into the cavity. Since the gingival tissue obscured the placement of rubber dam it was removed using electrosurgery (Parkell Sensimatic™-600 SE), following which pulp extirpation, cleaning and shaping was done and the cavity temporized with intermediate restorative material. After a month, she returned with grade I and II mobility in relation to 24 and 25 respectively with sequestrum formation near the cauterized site.

(Figs. 1 and 2). Under local anesthesia the sequestrum was removed (Fig. 3) and the bone defect between 24 and 25 filled with allograft (Puros®) and platelet rich fibrin (PRF) membrane was adapted over it (Figs. 4 and 5). Review after a week showed satisfactory healing and endodontic treatment was completed. The patient was reviewed for the next six months (Fig. 6) during which satisfactory bone fill was observed in radiographs (Fig. 7) with decrease in mobility from grade II to I in 25.

Discussion

The discovery and implementation of modern, sophisticated tools such as electrosurgery and lasers have led to a revolution in today's surgical practices. These have found a special place beside the scalpel and have become indispensable within a surgeon's kit. Electrosurgical units have been improvised since their discovery to counter some of their earlier complications such as patient burn, conductivity, etc. Despite its many advantages, iatrogenic and patient related factors can sometimes hamper their outcome and injury may occur in the following situations: direct application, insulation failure, direct coupling, and capacitive coupling, and so forth [10]. In this particular case, limited access and prevention of blood contamination made it essential to choose electrosurge over the surgical scalpel to excise the gingival overgrowth.

Electrosurgery refers to the passage of high frequency electrical current through the body to achieve a desired effect [11]. When applied through the active electrode, current gets concentrated at its tip and arcs across the tissue, thereby rapidly

Fig. 1 – Pre-operative photograph showing bone sequestrum between teeth 24 and 25.

Fig. 2 – Pre-operative radiograph showing PDL widening and bone loss between teeth 24 and 25.

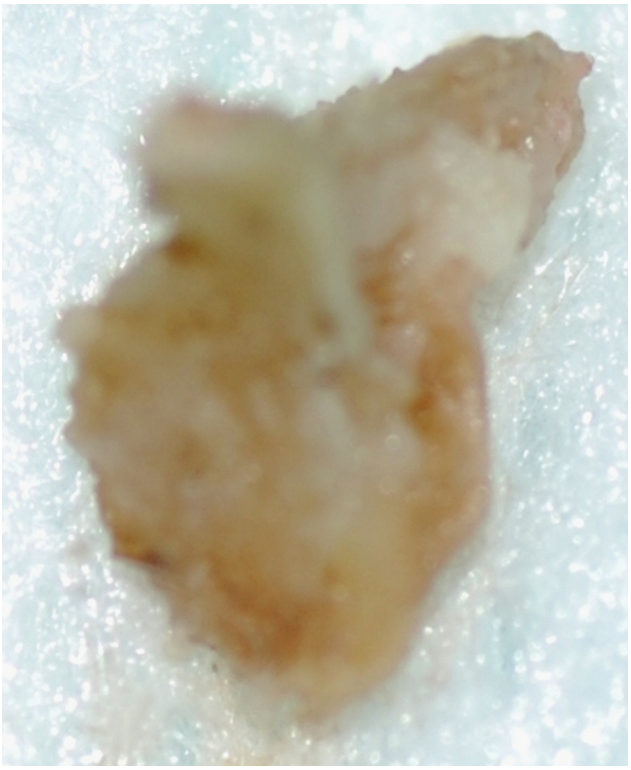

Fig. 3 – Excised bone sequestrum.

Fig. 4 – Flap elevation with bone defect seen between teeth 24 and 25.

elevating its intracellular temperature causing vaporization [12]. Two types of electrosurgical instruments are currently available namely the monopolar and the bipolar. Parkell Sensimatic™ 600 SE Electrosurge which is of monopolar type was used in this patient. It is a dental electrosurgery unit which employs a low-impedence, high frequency current that has multimodal settings such as cut, cut and coagulate and coagulation. In our case we selected the cut with balanced coagulation mode (RF Mode No. 2) which offers both cutting and coagulation to reduce bleeding.

Fig. 5 – Platelet rich fibrin membrane over bone graft.

The hyperplastic tissue was severed using a Bent straight wire loop (T2) dental electrode held near to the tissue. Though direct contact on bone was avoided as far as possible, formation of sequestrum occurred after a month. Such electrosurgical injuries can be minimized by following certain guidelines such as guiding the electrode over the tissues at a rate of 7 mm/s, reducing contact time with the tissues to 1–2 s followed by a 10–15 s cooling interval, using thinner diameter electrodes to reduce lateral dissipation of heat, avoiding contact of the non active end of the electrode against tooth surface [13,14].

In our case the sequestrum might have resulted from accidental contact of electrode with the bone which was very near to the operating area of interest. Studies have shown that marginal alveolar bone touched by an activated electrosurgery electrode produced bone destruction in a time dependant manner as a result of thermal necrosis without ablation and the damaged area was not replaced by new bone [15,16]. Since the sequestrum formed in relation to maxillary left first and second premolar teeth resulted in bone loss and ensuing mobility we decided to graft the site. The reason for choosing Puros® allograft is germane to the fact that allografts are next best only to autografts and have the advantage of avoidance of a second surgical site to harvest them. In addition we decided to conjoin a material that would provide both synergestic and ameliorating effect to the bone graft. The most positive outcome of periodontal regeneration process has been achieved with a combination of bone grafting and guided tissue regeneration [17]. Platelet rich fibrin (PRF) is a newly discovered biomaterial that can be obtained in a membrane form and used along with bone grafts. PRF being a reservoir of growth factors such as Platelet derived growth factor (PDGF) and Transforming growth factor (TGF) has inherent osteoconductive and osteoinductive properties that can enhance periodontal and bone regeneration in the recipient site. Its innate fibrin network can prevent the growth factors from proteolysis thus prolonging the activity of the later. The fibrin matrix is also capable of

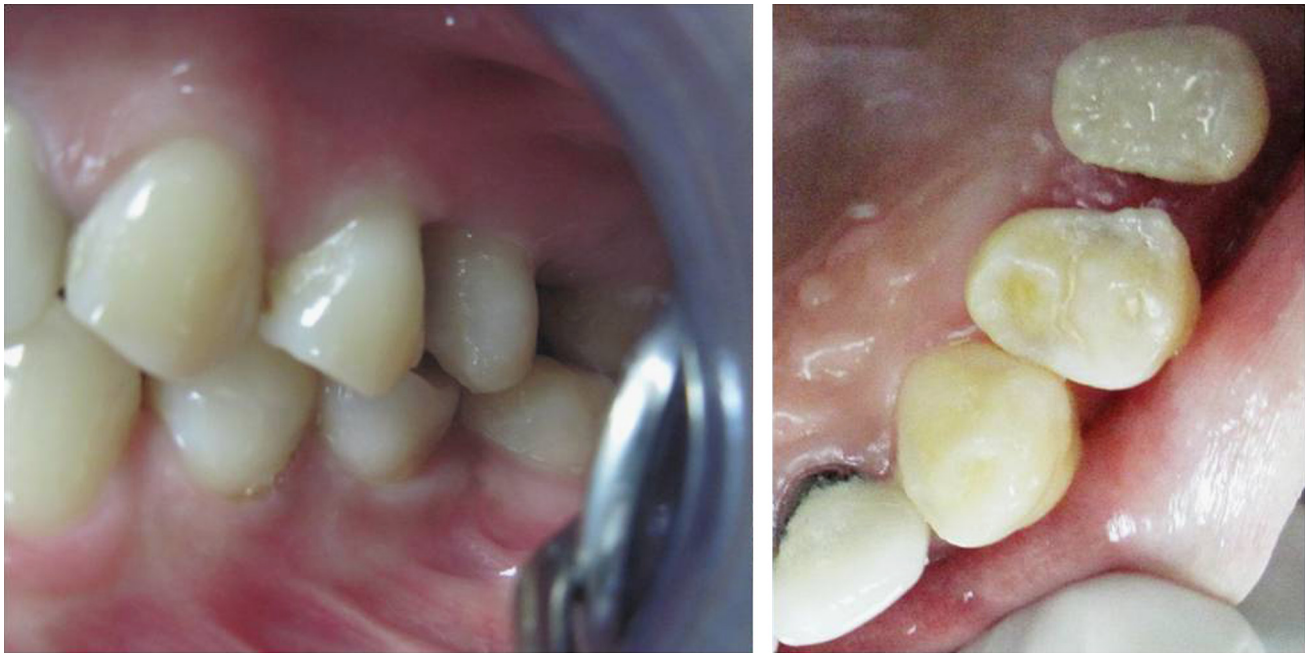

Fig. 6 – Six months postoperative photograph of teeth 24 and 25.

Fig. 7 – Six months radiograph showing bone fill in relation to tooth 24.

promoting wound healing, reducing the inflammatory process and can lead to angiogenesis [18].

All the above factors led to our decision of combining PRF along with Puros to achieve a predictable and stable outcome of the treated site which was achieved on six months follow up of our patient.

Conclusion

Our aim of presenting this report is to create awareness among the dental fraternity regarding electrosurgical injuries. Although the incidence of electrosurgical injuries is relatively uncommon in the dental operatory, if such injuries occur, dentists should be knowledgeable enough to handle such situations. In our report we have highlighted an injury caused by electrosurgery, with its management. To our knowledge, this is the first time platelet rich fibrin has been used in the management of intraoral electrosurgical injury. The authors feel that combining bone grafts with PRF is a good alternative as it can be done with relative ease and predictable outcome.

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